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# PCT



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Artcle 36 and Rule 70)

| Applicant's or agent's file reference PCA30539/IPN | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| International application No. **PCT/KR2003/001391** | International filing date *(day/month/year)* **14 JULY 2003 (14.07.2003)** | Priority date *(day/month/year)* 17 DECEMBER 2002 (17.12.2002) |

International Patent Classification (IPC) or national classification and IPC

**IPC7 H01L 21/205**

Applicant

**IBULE PHOTONICS INC. et al**

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| Date of submission of the demamd | Date of completion of this report |
|---|---|
| **15 JULY 2004 (15.07.2004)** | 22 MARCH 2005 (22.03.2005) |
| Name and mailing address of the IPEA/KR<br>Korean Intellectual Property Office<br>920 Dunsan-dong, Seo-gu, Daejeon 302-701,<br>Republic of Korea<br>Facsimile No. 82-42-472-7140 | Authorized officer<br>LEE, Yoon Jik<br>Telephone No. 82-42-481-5731 |

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International aplication No.
PCT/KR2003/001391

I. Basis of the report

1. With regard to the elements of the international application:*

☒ the international application as originally filed

☐ the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the claims:
pages _____ , as originally filed
pages _____ , as amended (together with any statment) under Article 19
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the drawings:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application(under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide** and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained inthe international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disc losure in the international applicationas as filed has been furinshed.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets _____

5.

☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box(Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed." and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION

International aplication No.
PCT/KR2003/001391

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Claims | 1-16 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | 1-16 | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | 1-16 | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents from the International Search Report (ISR).

D1: JP 12-068455 A
D2: JP 09-186376 A
D3: US 6054331 B
D4: KR 1998-80778 A
D5: JP 08-253324 A
D6: JP 13-107238 A
D7: JP 08-186182 A
D8: US 5650362 B
D9: US 6498097 B
D10: EP 0390139 A2

D1 discloses a method for obtaining a high dielectric constant capacitor, which comprises a thermal oxide film formed on the surface of a Si single-crystal (111) plane substrate, a Ta film formed thereon as an adhesive layer, a Ti-doped WN film formed via the adhesive layer as a lower electrode layer of a ferroelectric capacitor, a ferroelectric thin film PZT formed thereon, and a Ti-doped WN film formed on the ferroelectric thin film as an upper layer of the ferroelectric capacitor.

D2 discloses a thin film of ferroelectric crystal containing Bi, Ti and O as constitutive elements which can attain a high residual spontaneous polarization by shifting the compositional ratio of Bi/Ti from stoichiometric composition.

D3 discloses an apparatus and methods of depositing a platinum film which is used as a bottom electrode for a capacitor in a DRAM cell or a non-volatile ferroelectric memory cell. The platinum film is formed in two separate processes, wherein a first thickness platinum part thereof is deposited under an inert gas atmosphere, and the second thickness platinum part is deposited under an atmosphere containing oxygen, nitrogen and/or a mixture thereof as well as an inert gas. The platinum film is annealed under a vacuum atmosphere to remove the oxygen and/or nitrogen introduced during the deposition of the second thickness platinum part.

D4 discloses a manufacturing method of a high-quality SOI wafer which is excellent in controllability, productivity and economics.

D5 discloses a ferroelectric thin-film constitution body which is obtained by forming an oxide thin film of a Bi-based layer perovskite type crystal structure on a substrate so as to properly arrange the (c)-axis of the crystal axis in the direction perpendicular to the substrate surface and further forming a ferroelectric thin film having the perovskite type crystal structure represented by the general formula $ABO_3$ on the resultant oxide thin film.

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of:

Box V

D6 discloses a method for forming a ferroelectric film for a ferroelectric device for integrated circuit which embraces steps of: (a) forming a first lower electrode layer of platinum (Pt) having a first fit crystal lattice structure; and (b) forming a single phase Perovskite ferroelectric film which has a second crystal lattice structure practically identical with the first fit crystal lattice structure and is formed on the first lower electrode layer.

D7 discloses a ferroelectric thin film grown by the multidimensional ECR sputtering on a Pt thin film.

D8 discloses an oriented conductive thin film useful as a thin film electrode or a thin film resistor which may be made by coating a single crystal substrate with a metal oxide precursor solution containing an organometallic compound, and subjecting the coating layer to thermal decomposition, followed by annealing the coated substrate.

D9 discloses a platinum film orientation-controlled to (111), (200) and/or (220) which is provided by depositing the platinum film under an atmosphere containing an oxygen component.

D10 discloses a ferroelectric thin film consisting of a single crystal which has the perovskite structure.

Claims 1 to 16 of the present invention relate to a ferroelectric single crystal film structure and its preparing method, which comprises the steps of: forming a layer of a material having a perovskite crystal structure on a substrate as an electrode layer, and growing a layer of a ferroelectric single crystal on the electrode material layer by a pulsed laser deposition (PLD) or metallorganic chemical vapor deposition (MOCVD) method.

Document D1-D7, D9 and D10 do not disclose a electrode layer having a perovskite crystal structure. Document D5 and D8 disclose a electrode layer having a perovskite crystal structure, but does not disclose a ferroelectric 'single crystal' structure formed by a pulsed laser deposition. Therefore the novelty and the inventive step of the subject matter of the claims 1-16 is acknowledged.

The industrial applicability of the subject matter claimed in claims 1-13 is self-evident.